
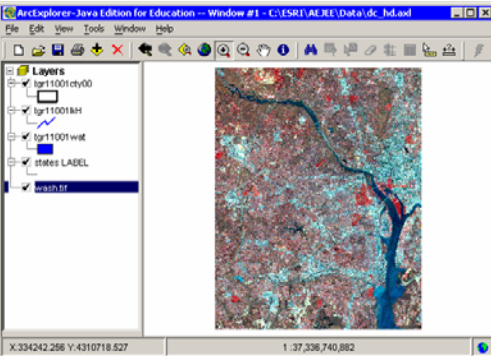


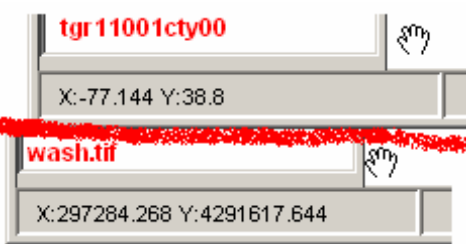
## Getting Started with ArcExplorer—Java Edition for Education – Lesson 4

This lesson covers the following ideas, tools, and capacities:

- Integrating image data
- Saving projects
- Adding data
- Event (XY) themes
- Hot links
- Buffer
- Catalog

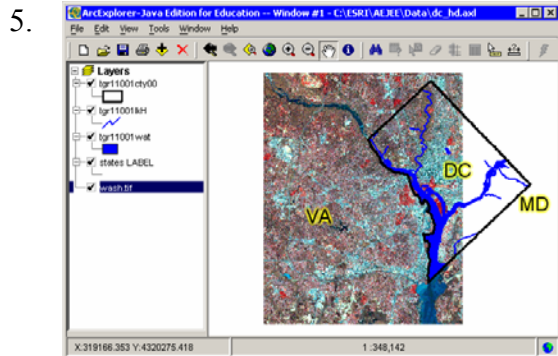
1.  Start AEJEE. Choose to open an existing project by clicking the "Open..." button or choose the menu item "FILE/OPEN". Navigate to where AEJEE data and projects are stored and choose **dc\_hd.axl**. Click the file and click "Open".

2.  The map opens with an image showing the Washington DC region. The TOC shows other layers are on, but they seem invisible. But if you right-click on "tgr11001cty00" and choose "Zoom to layer", the image disappears and the other layers appear. Right-click on "wash.tif" and zoom to it, and they shift back.


3.  When you make either the image or the other layers visible, and move the mouse around the map, the locator numbers in the status bar are wildly different.

**NOTE:** One of the exciting opportunities for map makers is integrating image data (such as satellite images or aerial photos) with "vector" data (features such as points, lines, polygons). It can be challenging to make sure that the resources are in formats that can work together, that the GIS and image data carry "metadata" (data about the data), and that the user can understand and make use of the metadata. AEJEE cannot project image data, but can project vector data that are stored in a decimal degree coordinate system. This means AEJEE can work with many image data sets ... if the user understands about working with images and shapefiles. Metadata are vital!

4. The satellite image is stored in a coordinate system called "Universal Transverse Mercator", in "Zone 18N", using the "North America 1983" datum. This can be abbreviated as "UTM 18, NAD83". By setting the view's projection to match this, we can integrate features stored in decimal degree.




Change the projection of the view to "**UTM Zone 18N**", in the "**Universal Transverse Mercator**" folder. Then zoom again to "**wash.tif**". The image and the features now line up! The shapefiles in the TOC are data stored in decimal degree, and can project on the fly to match image data.

- 6.
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- Now that we've made an important change to the project, it's time to save the project, but under a new name so we don't overwrite the old one. From the menu bar, choose "**File/Save As...**". Navigate to where the AEJEE projects are stored (typically **/ESRI/AEJEE/DATA**), and name this "**dc\_hd2.axl**". Having renamed this and preserved the original, you can either continue renaming to save each version of your work, or just save the latest version.

7. Atop the image are some shapefiles that came originally from the U.S. Census Bureau, and the names look a little unusual here. Every county (or equivalent) in the U.S. has a unique 5-digit code, and Washington DC is known as "11001". Let's start by giving those layers more understandable names. Change "**tgr11001wat**" to "waters", "**tgr11001kh**" to "streams", and "**tgr11001cty00**" to "DC boundary".

**NOTE:** The shapefiles came from the ESRI TIGER Data website ([www.esri.com/tiger](http://www.esri.com/tiger)). From here, GIS users can download data about any county in the U.S. See [www.esri.com/industries/k-12/atlas/tiger.html](http://www.esri.com/industries/k-12/atlas/tiger.html) for a tutorial about accessing the data.

- 8.
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- Now let's add another layer to our map. Click the "**Add Data...**" button and navigate to where the AEJEE data about DC are stored (typically **/ESRI/AEJEE/DATA/WASHDC**). Several files are visible there, and some are already in the project. Click "**tgr11001ka.shp**" and click "**OK**".

9. The new line feature comes in at the top of the TOC. Zooming in, you can tell that these are roads, so rename this layer to "roads". Then open the "**Properties**" and change the symbol to a black line, single width. You've made some pretty significant changes to your project, so you should save (or "save as") again.

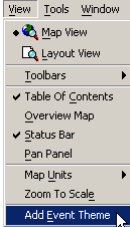
10. The whole satellite image is interesting, but we want to zoom in to the bluish area at the heart of Washington DC, just north of the junction of the two main rivers – the Potomac and the Anacostia. Zoom to a scale of about 1:60,000 or closer. You should be able to see the red east-west stripe that is the Mall.
11. We want to add some point data for interesting sites, gathered with a global positioning system (GPS). First we need to create a data table to bring into AEJEE. Open up a simple text editor, such as NotePad (PC) or TextEdit (Mac; set TextEdit preferences to create new documents as "plain text", then make a new document). Create a plain text document that looks exactly like this:

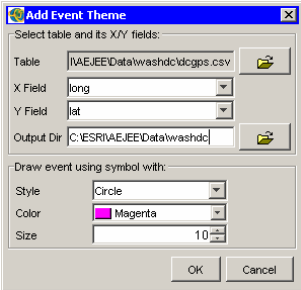
```
site,lat,long,name,HOTLINK
1,38.889,-77.035,Washington Monument,http://www.nps.gov/wamo
2,38.889,-77.050,Lincoln Memorial,c:/ESRI/AEJEE/DATA/WASHDC/linc.jpg
3,38.898,-77.036,White House,c:/ESRI/AEJEE/DATA/WASHDC/whse.txt
4,38.889,-77.009,Capitol,c:/ESRI/AEJEE/DATA/WASHDC/cap.pdf
```

**NOTE#1:** HOTLINK files must be "absolute paths." Be sure the paths above are correct for your computer. For Mac users, change the three characters "**c:/**" in items #2, #3, and #4 above to "**file:///**".

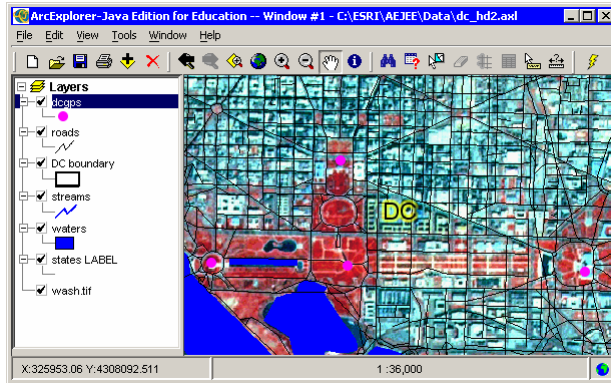
Make sure you have only these five lines, with no extra spaces or characters that are not shown above. (Notice the latitudes are identical except for the White House, and the longitudes are all negative. Also, note that "HOTLINK" must be capitalized.) Save this as a plain text file called "**dcgps.csv**" (for "Comma Separated Values") in the folder "**/ESRI/AEJEE/DATA/WASHDC**". Exit your text editor and return to AEJEE.

**NOTE#2:** Make sure your computer does not add ".txt" at the end of the file name. AEJEE expects all ".txt" files to be "tab-delimited", and all "comma-delimited" files to be ".csv". Ask your tech coordinator about file extensions.

12.  The file "**dcgps.csv**" is now a set of data that is almost but not quite ready to use in AEJEE. It needs to be converted from a simple text file to a true GIS data set -- a shapefile (which is actually a combination of files). AEJEE cannot create shapefiles of lines or polygons, but can convert simple XY data tables of points (or "events") into a point shapefile. From the menu bar, choose "**View/Add Event Theme**"

13.  Navigate to the file "**dcgps.csv**" and select it. For the "**X field**", choose "**long**" (longitude); for the "**Y field**", choose "**lat**" (latitude). AEJEE is going to convert the table into a shapefile, so it has to store the data, and the default is to use the folder where the table is; this is a good storage spot. After conversion, AEJEE will add the data to the TOC using symbols shown at the bottom; because your map already has a lot of information, you'll want to choose a symbol that will stand out – large dots with a noticeable color. When ready, click "**OK**".

14.



Now, you have a new data set visible in your project! Zoom to the layer or adjust the scale to optimize the display. You could even label the new features.

**NOTE:** Hot links in AEJEE launch whatever application is the default viewer of a given file type. The HOTLINK field must contain an "absolute path" to a given document; if the path is wrong or there is no default application for a file type, AEJEE will perform no action when called upon to access a hot linked document. Also, because some programs take time to open and appear, it is useful if you have these programs already running in the background before clicking the hot link.

15.

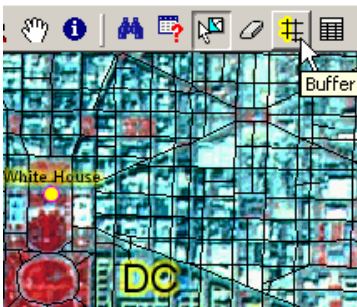
Because your coordinates were stored in decimal degree, and the view is already projected, the points appear in their proper location. Use the identify tool to review the attributes of the point features, especially the "**HOTLINK**" field.

16.



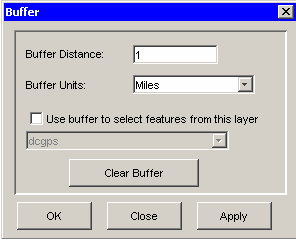
Click the "**Hot Link**" button and then click the White House (northernmost dot). It should call up a very short text file about the White House. Then click on the Capitol (easternmost dot), which should call up a PDF file in your PDF viewer. Then click on the Lincoln Memorial (westernmost dot), which should call up a small image in your default JPG viewer. Finally, click on the Washington Monument (central dot); this will open your web browser and, if you are connected live to the internet, bring up a Web page.

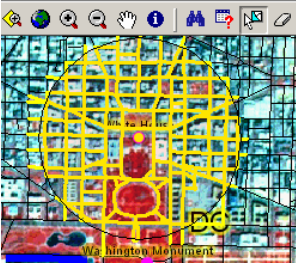
17.



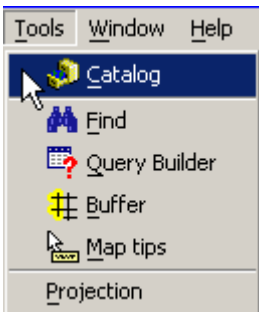
Suppose that we now want to see something about distance from a single feature, like the White House. Click on the "**Select Features**" tool and choose "**Rectangle**". Click and drag a small box around the symbol for the White House. A yellow dot appears, indicating the White House has been selected. Then click the "**Buffer**" tool.

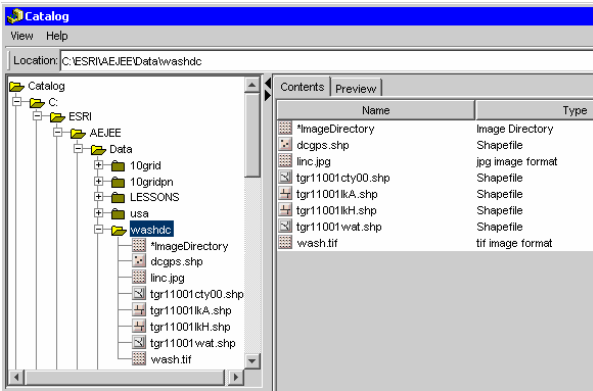
**NOTE:** Selecting features according to distance from another feature is a key power of GIS. Users often need to know what's near, or not within a certain distance. For law enforcement, habitat protection, marketing, and myriad other purposes, "distance from a feature" is crucial.

18.  Choose as a distance 1 mile, and click "OK". Around the White House will appear a lightly shaded circle with a radius of 1 mile. (It may help to turn off the "**wash.tif**" image, and then turn it on again.) Which of the three other GPS features is not within a mile of the White House?

19.  Erase the 1-mile buffer by clicking the "**Clear All Selection**" button. Use the "**Select**" tool to select the White House again. Click on the "**Buffer**" tool and choose as a distance 0.5 miles, and this time ask AEJEE to select features from the layer "**roads**", then click "OK". The yellow road segments are all within a half-mile of the White House.

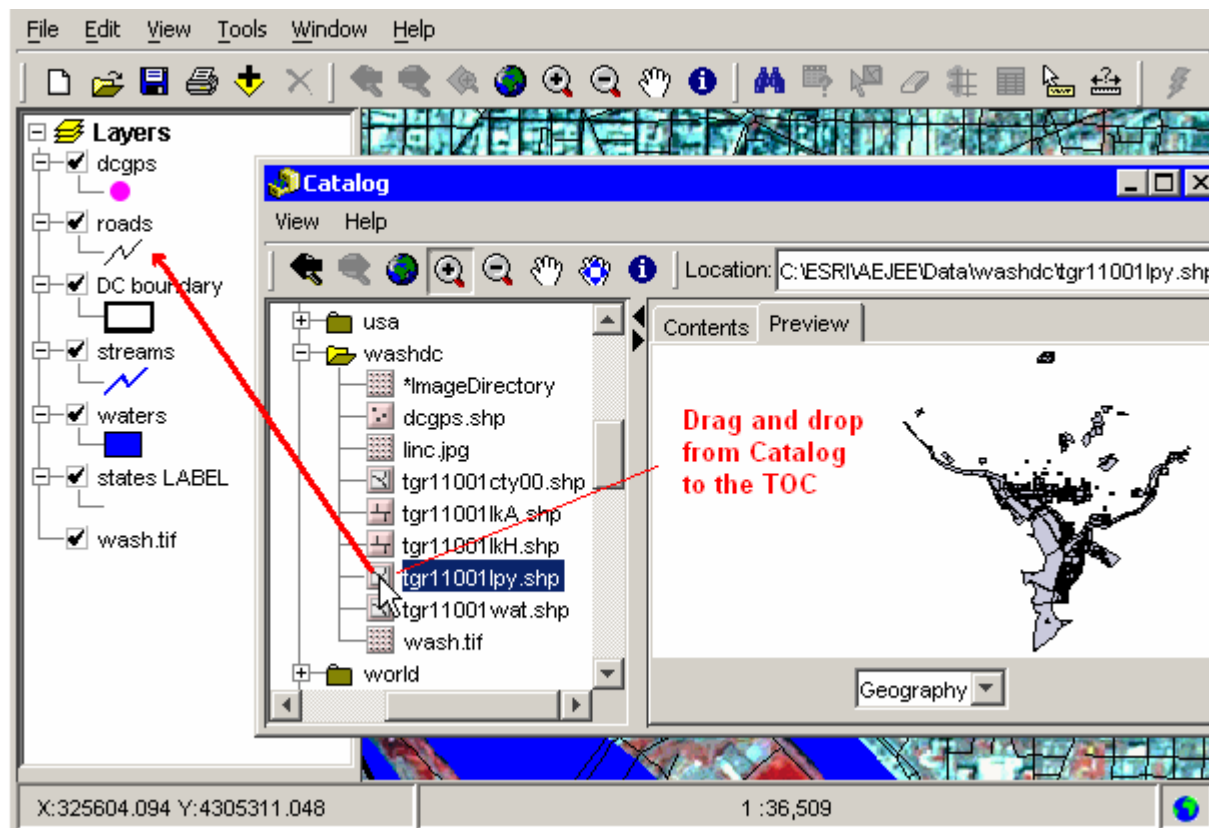
20. Save your project as "**dc\_hd3.axl**".

21.  The last portion of this lesson deals with a special capacity built into AEJEE. Suppose you want to explore the data available for AEJEE. You could add it all, bit by bit, layer by layer, but that can be extremely tedious. It would be a lot easier if there were a neat little tool for browsing data. There is ... the Catalog. From the menu bar, choose "**Tools/Catalog**".

22.  Using a "tree hierarchy" and the ability to "spill open" or "close up" folders one at a time, the Catalog allows you to see quickly what data sets might be available for use. Navigate to the folder **/ESRI/AEJEE/DATA/WASHDC**.

23. In the left column, click the item "**dcgps.shp**". What does it say on the right? Notice the right side has a "**Contents**" tab and a "**Preview**" tab. Click "**Preview**", and set the tab at the bottom of the "**Preview**" window to "**Geography**". Under the "**View**" menu, choose "**Toolbars/Pan-Zoom**"; these tools should look familiar. Click with the "**Identify**" tool on one of the dots. Change the tab at the bottom of the "**Preview**" window from "**Geography**" to "**Table**". Compare what you see in the "**Preview**" window for some of the other features.





24. Finally, locate the polygon shapefile "**tgr11001py.shp**" in the left column. (The icon in the left column shows that it is a set of polygons, rather than lines or points or an image.) After previewing it in the right column, drag the icon from the left column into the TOC. These new polygons will drop in below the roads. Close the Catalog.
25. **REVIEW:** In this lesson, we have covered the following ideas, tools, and capacities:
  - Integrating image data
  - Saving projects
  - Adding data
  - Event (XY) themes
  - Hot links
  - Buffer
  - Catalog

26. **SELF CHECK:** Now it's time to see if you can use these concepts and skills on a new set of data. Create a brand new AEJEE project, saved as **"dc\_selfcheck.axl"**, consisting of these layers:

\* **"dcurban.jpg"** (stored in UTM1983 Zone 18)

\* **"dcgps.shp"** labeled in the TOC as "Points 1-4", shown as red stars

\* **"dcgps2.csv"** built as a new text file, converted to a shapefile, shown as blue stars, and containing these three lines:

```
site,lat,long,name,HOTLINK
5,38.905,-77.037,National Geographic,http://www.nationalgeographic.com
6,38.889,-76.971,RFK Stadium,http://www.dcsec.com
```

\* **"tgr110011ka.shp"** labeled in the TOC as "roads", shown as black lines

\* **"tgr11001cty00.shp"** labeled as "DC Boundary", shown as a grey polygon

Then, find out which items from **"dcgps.shp"** are within one mile of the National Geographic.

## FOR THE TEACHER:

- 26-A This project is a comprehensive task. The students need to:
- create and save a project
  - add layers
  - project the view into UTM1983 Zone 18
  - build a data table with hot links and convert it into a shapefile
  - set the layer names and display characteristics
  - select a feature and create a buffer which selects features from another layer

The final results should look something like this:

